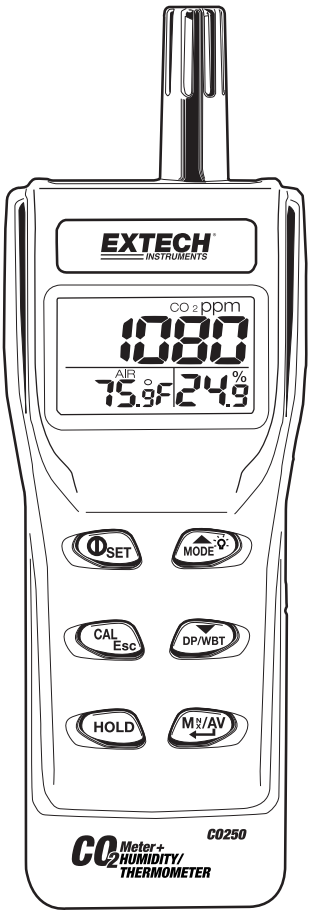
User's Guide

EXTECH INSTRUMENTS

CO_2 Meter

Model CO250



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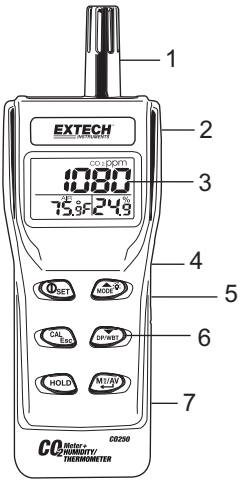
Introduction

Congratulations on your purchase of this Model CO250 Meter. This meter measures CO_2 (Carbon Dioxide) levels, air temp., dew point, wet bulb temperature and humidity and is an ideal instrument for indoor air quality (IAQ) diagnosis. This meter is shipped fully tested and calibrated and, with proper use, will provide years of reliable service.

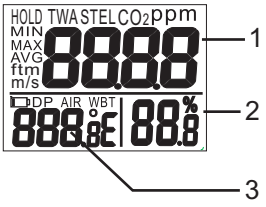
Meter Description

METER

1. Temperature and Humidity sensor
2. CO_2 sensor (rear)
3. LCD display
4. AC Adaptor connector
5. RS232 port
6. Keypad
7. Battery compartment (rear)



LCD DISPLAY



1. CO2 concentration in ppm
2. Relative Humidity in %
3. Air Temperature, Dew Point or Wet Bulb Temperature

SYMBOLS

TWA	Time weighted average (8 hours)
STEL	Short-term exposure limit (15 minutes weighted average)
HOLD	Freezes current reading on display
MIN/MAX	Minimum/Maximum readings
	Low battery indicator
DP	Dew point temperature
AIR	Air temperature
WBT	Wet bulb temperature
%	Unit of relative humidity
C or F	Celsius/Fahrenheit

KEYPAD

SET — Turns the meter on and off.
Enters setup mode.
Sets as non-sleep mode with HOLD.

CAL Esc — Exits setup page/mode.
Enters CO_2 calibration with MODE.
Enters RH calibration with DP/WBT.

HOLD — Freezes the current reading on display.
Cancels data hold function.

MODE — Activates or cancels the backlight.
Selects unit or increases value in setup.

DP/WBT — Selects AIR, DP, WBT temps display.
Selects unit or decreases value in setup.

M/AV — Activates MIN,MAX,STEL,TWA function.
Saves and finishes settings.

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Operation

BATTERY INSTALLATION

The meter is powered by 4 AA batteries or a DC adaptor. Install the batteries into the rear battery compartment observing correct polarity. When an adaptor is used, the batteries will be disconnected from the meter. The adaptor cannot be used as a battery charger. When the battery voltage drops below the required level, and "Lob" will appear on the display, a beeper sounds and readings are no longer displayed. (Press any key but the SET to stop the beeps). Replace the batteries to resume normal operation.

You, as the end user, are legally bound (**EU Battery ordinance**) to return all used batteries, **disposal in the household garbage is prohibited!** You can hand over your used batteries / accumulators at collection points in your community or wherever batteries / accumulators are sold!

Disposal: Follow the valid legal stipulations in respect of the disposal of the device at the end of its lifecycle

POWER ON/OFF

Press SET to turn the meter on and off. At power up, the meter emits a short beep and performs a 30 second countdown for meter warm up. It then enters the normal operation mode with current CO_2, temperature and humidity readings displayed.

TAKING MEASUREMENT

The meter starts measurements when powered on and updates readings every second. If the operating environment changes (ex. from high to low temp.), it takes 30 seconds for CO_2 sensor to respond and 30 minutes for RH.

NOTE: Do not hold the meter close to your mouth or any other source of CO_2.

AIR, DP and WBT Measurements

Press the **DP/WBT** button to switch temperatures display. The lower left display will cycle from "AIR" air temperature, "DP" dew point temperature and "WBT" wet bulb temperature.

DATA HOLD

Press the **HOLD** button to freeze the readings, the "HOLD" icon is displayed on the left top of the display. All current readings are held unchanged, except STEL and TWA. Press "HOLD" again to cancel the hold function.

BACKLIGHT

Press the **MODE/▲** button for more than 1 second to activate or to cancel backlight function.

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MIN,MAX,STEL,TWA

In the normal mode, press the **Max/AV** button to see the minimum, maximum, and weighted average readings. With each press of the **Max/AV** button, the meter displays MIN, MAX, STEL, TWA in sequence and then returns to the normal mode.

In MIN and MAX modes, the meter shows the minimum and maximum readings of CO_2 (main display), AIR, DP or WB temperatures (lower left display) and Humidity (lower right display).

In STEL and TWA modes, the main display shows the weighted average of CO_2 readings for the past 15 minutes (STEL) or 8 hours (TWA). The lower displays are the current measurements

NOTE:

1. If the meter has been powered on for less than 15 minutes, the STEL value will be the weighted average of readings taken since power on. As well, the TWA mode will display a weighted average of readings prior to 8 hours of operation.
2. The CO250 takes at least 5 minutes to calculate STEL and TWA. The display shows "----" during the first 5 minutes from power on.

3. The STEL and TWA values will keep updating every 5 minutes.

ALARM

The meter features an audible alarm to give warnings when CO_2 concentration exceeds the set limit. It emits beeps (Abt.80dB) when CO_2 level goes over the set value and stops when any key (except SET) is pressed or the readings fall below the set value. It beeps again if the value exceeds the limit. Restart the meter if the beeper will not stop.

AUTO POWER OFF

The meter turns off automatically after 20 minutes of inactivity. To override the function, press and hold down the SET and **HOLD** buttons until "**n**" appears in the display (approx. 2 seconds) while turning on the meter on. NOTE: Auto sleep function will be disabled during calibration mode.

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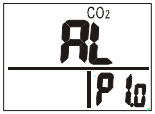
SETUP (alarm limit and temperature scale)

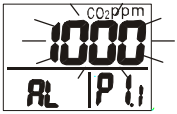
In the normal mode press and hold the SET button for more than 1 sec to enter the setup mode. To exit the setup mode, press the **CAL/Esc** button when either P1.0 or P3.0 is displayed.

P1.0 CO_2 ALARM Limit

When entering setup mode, P1.0 and "AL" are displayed.

Press the **MN/AV** button to scroll to P1.1 for setting CO_2 alarm threshold. The current CO_2 set value will be blinking.





Press the **MODE/▲** button to increase or the **DP/WBT/▼** button to decrease the value. Each press adjusts 100 ppm. The alarm range is from 100 to 9900ppm. When the preferred alarm value is set, press the **MN/AV** button to exit and save the setting or the **CAL/Esc** button to exit without saving and return to P1.0.

P3.0 TEMPERATURE SCALE

Press the **MODE/▲** button or the **DP/WBT/▼** button in P1.0 to access P3.0 for setting the temperature scale.

Press the **MN/AV** button to go into P3.1 for setting the temperature units. The currently selected units (°C or °F) will be blinking in the display. To switch units, press the **MODE/▲** button. Press the **MN/AV** button to save the setting or press the **CAL/Esc** button exit without saving and return to P3.0.

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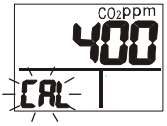
Calibration

CO_2 CALIBRATION

The meter is calibrated to a standard 400ppm CO_2 concentration at the factory

NOTE: When the accuracy becomes a concern or after a year of use, return to Extech for a standard calibration.

CAUTION: Do not calibrate the meter in an atmosphere of unknown CO_2 concentration.



1. Place the meter in the 400ppm calibration chamber. Turn the meter on and hold down the **CAL/Esc** and **MODE/▲** buttons simultaneously to enter CO_2 calibration mode. 400ppm and "CAL" will blink on the LCD while performing calibration.
2. Wait about 5 minutes until the blinking stops. The calibration is then completed and the meter automatically returns to the normal mode.

NOTE: Ensure the batteries are fresh prior to calibration to prevent an interruption or failed calibration.

RH CALIBRATION

The meter is calibrated to a standard 33% and 75% salt solution bottle.

CAUTION: Do not calibrate the humidity without the default calibration salt. Otherwise, permanent damage could occur. Contact the Extech for calibration salts or services.

33% calibration

1. Plug the sensor probe into 33% salt bottle.
2. In the normal mode, Press and Hold the **CAL/Esc** and **DP/WBT/▼** buttons to enter the 33% calibration. "CAL" and calibrating value (32.7% if at 25°C) will blink on the LCD with current temperature at the left.
3. The meter is now calibrating, and will finish in about 60 minutes when "CAL" and humidity stop blinking.

75% calibration

1. After the 33% calibration, plug the sensor probe into a 75% salt bottle.
2. Press the **MN/AV** button to enter 75% calibration.
3. "CAL" and calibrating value (75.2% if at 25°C) will blink on the LCD with current temperature at the left.
4. The meter is now calibrating. Wait about 60 minutes until the blinking stops, then calibration is completed and the meter will return to normal mode.

NOTE: Single point calibrations are allowed. To calibrate 33% only, press **CAL/Esc** and exit when 33% calibration is completed. To calibrate 75% only, press **MODE/▲** within the 5 minutes while initializing 33% calibration.

PC CONNECTION

The meter is equipped with an RS-232 PC interface jack (3.5mm phono) for connection to a PC. The supplied cable and Windows™ compatible software allows the user to store readings in a text file and display real-time measurements in a series of selectable formats. For more information or specific operating instructions, refer to the User Guide included with the software.

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Specifications

Function	Range	Resolution	Accuracy
CO_2	0 to 5000ppm	1ppm	±(%5rdg + 50ppm)
	5000 to 9999ppm	1ppm	Not specified
	Pressure dependence: +1.6% reading per kPa deviation from normal pressure, 100kPa		
Temperature	-10 to 60°C 14 to 140°F	0.1°	±0.6°C/0.9°F
Humidity	0.0 to 99.9%	0.1%	±3%(10 to 90%) ±5%(< or > 10 to 90%)
Wet Bulb	-5 to 60°C 23 to 140°F	0.1°	Calculated from RH and Temperature
Dew Point	-20 to 60°C -4 to 140°F	0.1°	

Display Triple LCD with backlight

Sensor Type CO_2: NDIR (non-dispersive infrared) technology
Humidity: Capacitance sensor;
Temperature (air): Thermistor

Operating Conditions 0 to 50°C (32 to 122°F); < 95% RH non-condensing

Storage Conditions -20 to 60°C (-4 to 140°F); <99% RH non-condensing

Power Supply 4 x 1.5V 'AA' batteries or AC adaptor (9V/1A)

Battery Life approx. 24 hours (alkaline batteries)

Dimensions / Weight 200x70x57mm (7.9x2.7x2.3")/190g (6.7 oz.)

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Maintenance

CLEANING AND STORAGE

1. The meter should be cleaned with a damp cloth and mild detergent when necessary. Do not use solvents or abrasives.
2. Store the meter in an area with moderate temperature and humidity (refer to the operating and storage range in the specifications chart earlier in this manual).

TROUBLESHOOTING

Can't power on
Press ⏻SET for more than 0.3 seconds and try again. Check that the batteries have good contact and the correct polarity or that the AC adaptor is properly connected.

Slow response
Check whether the air flow channels on the rear of the meter are blocked.

Error messages
E01: CO_2 sensor damaged.
E02: The value is under range.
E03: The value is over range.
E04: The original data error results in this error (DP, WB)
E07: Too low voltage to measure CO_2, replace batteries or use an adaptor.
E11: Retry humidity calibration.
E17: Retry CO_2 calibration.
E31: Temperature sensor damaged.
E34: Humidity sensor damaged.

CO_2 Levels and Guidelines

Non-Enforced Reference levels:

- 250 - 350 ppm – background (normal) outdoor air level
- 350- 1,000 ppm - typical level found in occupied spaces with good air exchange.
- 1,000 – 2,000 ppm - level associated with complaints of drowsiness and poor air.
- 2,000 – 5,000 ppm – level associated with headaches, sleepiness, and stagnant, stale, stuffy air. Poor concentration, loss of attention, increased heart rate and slight nausea may also be present.
- >5,000 ppm – Exposure may lead to serious oxygen deprivation resulting in permanent brain damage, coma and even death.

Regulatory exposure limits:

ASHRAE Standard 62-1989: 1000ppm: CO_2 concentration in occupied building should not exceed 1000ppm.

OSHA: 5000ppm: Time weighted average over five 8-hour work days should not exceed 5000ppm

Building bulletin 101 (Bb101): 1500ppm. UK standards for schools say that CO_2 at averaged over the whole day(i.e. 9am to 3.30 pm) should not exceed 1500ppm.

Germany, Japan, Australia, UK...: 5000ppm, 8 hours weighted average in occupational exposure limit is 5000ppm.

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